IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of :

Karine Ragil et al. Group Art Unit: 1764

Serial No.: To be assigned Examiner: N. Preisch

Filed: Herewith

For: HIGH OCTANE NUMBER GASOLINES AND THEIR PRODUCTION USING A PROCESS ASSOCIATING HYDRO-ISOMERISATION AND SEPARATION

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to initial examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please cancel claims 1-5 without prejudice or disclaimer.

Please amend claims 6-10, 12-20, 22-25 as follows:

6. (Amended) A process for producing a gasoline stock by hydro-isomerisation of a feed constituted by a C5 to C8 cut or fraction thereof containing at least C7 paraffins, comprising:

conducting hydro-isomerization in at least one hydro-isomerization section comprising at least one reactor; and

performing a separation in at least one separation section comprising at least one adsorption separation unit or at least one permeation separation unit wherein said separation produces at least two streams: a first stream which is rich in di- and tri-branched paraffins, and optionally contains naphthenes and aromatic compounds, which is sent to a gasoline pool to provide a minimum content of 2% by weight of C7 - di-branched paraffins in the gasoline pool; and a second stream which is rich in straight-chain paraffins and mono-branched paraffins;

wherein said separation section is located upstream or downstream of said hydro-isomerization section, said second stream is introduced into said hydro-isomerization section, and effluent from said hydro-isomerization section is introduced into said separation section.

7. (Amended) A process for producing a gasoline stock by hydro-isomerization of a feed constituted by a C5 to C8 cut or fraction thereof, containing at least C7 paraffins, comprising:

conducting hydro-isomerization in at least two hydro-isomerization sections and performing a separation in at least one separation section comprising at least one adsorption separation unit or at least one permeation separation unit in which the separation section produces three streams:

a first stream which is rich in di and tri-branched paraffins, and optionally contains naphthenes and aromatic compounds, which is sent to a gasoline pool to provide a minimum content of 2% by weight C7-di-branched paraffins in the gasoline pool; a second stream which is rich in straight-chain paraffins which is recycled to an inlet of the first hydro-isomerization section; and a third stream which is rich in mono-branched paraffins which is recycled to an inlet of the second hydro-isomerization section, and

wherein the operating conditions of the first and second hydroisomerization sections are different.

8. (Amended) A process according to claim 7, in which all of the effluent from said first hydro-isomerization section traverses said second hydro-isomerization section.

9. (Amended) A process according to claim 8, wherein:

the separation section is located downstream of the hydro-isomerization sections,

the feed is mixed with the straight-chain paraffins recycled from the separation section and the resultant mixture is sent to the first hydro-isomerization section,

effluent leaving the first hydro-isomerization section is mixed with the stream which is rich in mono-branched paraffins from the separation section and the resultant mixture is sent to the second hydro-isomerization section, and

effluent from the second hydro-isomerization section is sent to the separation section.

10. (Amended) A process according to claim 8, wherein:

the separation section is located upstream of the hydro-isomerization sections,

the feed is mixed with the stream from the second hydro-isomerization section and the resultant mixture is sent to the separation section,

effluent which is rich in straight-chain paraffins is sent to the first hydro-isomerization section, and

the stream which is rich in mono-branched paraffins from the separation section is added to the effluent from the first hydro-isomerization section and the resultant combined streams are sent to the second hydro-isomerization section.

12. (Amended) A process according to claim 6, in which the separation section comprises at least two distinct units to carry out two different types of separation.

13. (Amended) A process according to claim 6, in which the separation section comprises one or more sections operating by adsorption and the feed contains more than 12 mole % C7+.

14. (Amended) A process according to claim 6, in which the separation section comprises one or more sections operating by permeation.

15. (Amended) A process according to claim 12, in which the separation section comprises at least one unit operating by adsorption and at least one unit operating by permeation.

16. (Amended) A process according to claim 6, in which at least one light fraction is separated by distillation in a distillation column upstream or downstream of the hydro-isomerization and/or separation sections, said light fraction having an average boiling point lower than the average boiling point of feed entering said distillation column.

17. (Amended) A process according to claim 6, in which the feed contains a C5 cut and at least one deisopentanizer and/or at least one depentanizer are located upstream or downstream of the hydro-isomerization and/or separation sections.

18. (Amended) A process according to claim 6, in which the feed contains a C6 cut but contains no C5, and at least one deisohexinizer is located upstream or downstream of the hydro-isomerization and/or separation sections.

19. (Amended) A process according to claim 16, in which the light fraction or isopentane and/or pentane and/or a mixture of the two, or hexane, act as an eluent or a flushing gas for the adsorption or permeation separation unit, respectively.

20. (Amended) A process according to claim 6, in which butane and/or isobutane is used as an eluent or a flushing gas for the adsorption or permeation separation unit, respectively.

22. (Amended) A process according to claim 6, in which the feed comprises at least 12 mole % of hydrocarbons containing at least 7 carbon atoms.

23. (Amended) A process according to claim 6, in which the feed comprises at least 15 mole % of hydrocarbons containing at least 7 carbon atoms.

24. (Amended) A process according to claim 6, in which hydro-isomerization is carried out at temperatures in the range 25°C to 450°C, at a pressure in the range 0.01 to 7 MPa, at a space velocity in the range 0.5 to 2 kg feed/kg catalyst/hr, and with an H2/hydrocarbons molar ratio in the range 0.01 to 50.

25. (Amended) A process according to claim 6, in which separation is carried out at temperatures in the range 50°C to 450°C and at a pressure in the range 0.01 to 7 MPa.

Please add the following new claims:

26. (New) A process according to claim 7, wherein at least one light fraction is separated by distillation upstream or downstream of the hydro-isomerisation and/or separation sections, the feed comprises at least 12 mole % of hydrocarbons containing at least 7 carbon atoms, and wherein the hydro-isomerisation is conducted at 50ºC-450ºC at a pressure of 0.01-7 mPa, at a space velocity in the rage 0.5 to 2 kg feed/kg catalyst/hr, and with an H2/hydrocarbons molar ratio in the range 0.01 to 50.

27. (New) A process for producing a gasoline stock by hydroisomerization, said process comprising:

separating in at least one separation section at least one fraction of a C5 to C8 stream containing at least C-7 paraffins, straight-chain paraffins, mono-, di-, and tri-branched paraffins and optionally naphthenes and aromatic compounds, into (1) a C5-C8 stream rich in di- and tri-branched paraffins and containing C7- di-branched paraffins and (2) at least one fraction of a C5-C8 effluent rich in straight chain and mono-branched paraffins;

subjecting said effluent to hydroisomerization in at least one hydroisomerization section, to obtain at least one hydromerizate;

recycling said at least one fraction of a C5-C8 hydromerizate to said at least one separation section; and

passing stream (1) to a gasoline pool to provide a minimum content of C7 - di-branched paraffins of 2% by weight.

28. (New) A process according to claim 27, wherein said first stream rich in di- and tri-branched paraffins comprises sufficient di-branched paraffins containing 7 carbon atoms so as to provide a content of at least 2% C7- di-branched paraffins in a gasoline pool.

29. (New) A process according to claim 6, wherein said feed is a C7-C8 straight run cut.

30. (New) A process according to claim 6, wherein said content of di-branched paraffins containing 7 carbon atoms is at least 3%.

31. (New) A process according to claim 6, wherein said content of di-branched paraffins containing 7 carbon atoms is at least 4.5%.

32. (New) A process according to claim 27, in which the feed comprises at least 12 mol% of hydrocarbons containing at least 7 carbon atoms.

33. (New) A process according to claim 27, in which the feed comprises at least 15 mol% of hydrocarbons containing at least 7 carbon atoms.

34. (New) A process according to claim 6, wherein the content of C5- di-branched paraffins in said stream rich in di and tri-branched paraffins is 12.6 to 14.9% by weight.

35. (New) A process according to claim 27, wherein the content of C5- di-branched paraffins in said stream rich in di and tri-branched paraffins is 12.6 to 14.9% by weight.

36. (New) A process for producing a gasoline stock by hydroisomerization and separation of C5 to C8 feed stream containing at least C-7 paraffins, straight-chain paraffins, mono-, di-, and tri-branched paraffins, and optionally naphthenes and aromatic compounds, into (1) a C5-C8 stream rich in di- and tri-branched paraffins and containing C7- di-branched paraffins (2) a first C5-C8 effluent rich in straight chain pariffins, and (3) a second C5-C8 effluent rich in mono-branched paraffins; said process comprising:

first and second serially connected separation sections and first and second hydroisomerization sections, wherein said C5 to C8 feed stream is introduced into said first separation section, said first C5-C8 effluent rich in straight chain paraffins is withdrawn from said first separation section, and said second C5-C8 effluent rich in mono-branched paraffins is withdrawn from said second separation section,

said first C5-C8 effluent is subjected to hydroisomerization in said first hydroisomerization section and the resultant first hydromerizate is recycled to the inlet of the first separation section;

said second effluent stream is subjected to hydroisomerization in said second hydroisomerization section operated under conditions different from the first hydroisomerization section and the resultant second hydroisomerizate is recycled to the inlet of the second separation section downstream of said first separation section, and

stream (1) is withdrawn from said second separation section and delivered to a gasoline pool to provide a minimum content of C7- di-branched paraffins of 2% by weight.

37. (New) A process for producing a gasoline stock by hydroisomerization and separation of C5 to C8 feed stream containing at least C-7 paraffins, straight-chain paraffins, mono-, di-, and tri-branched paraffins, and optionally naphthenes and aromatic compounds, into (1) a C5-C8 stream rich in di- and tri-branched paraffins and containing C7- di-branched paraffins and (2) a first C5-C8 effluent rich in straight chain paraffins, and a second C5-C8 effluent rich in mono-branched paraffins; said process comprising:

introducing said C5-C8 feed stream into at least one separation section, withdrawing said first C5-C8 effluent rich in straight chain paraffins from said at least one separation section, and withdrawing said second C5-C8 effluent rich in mono-branched paraffins from said at least one separation section,

subjecting said first C5-C8 effluent to hydroisomerization in a first hydroisomerization section,

subjecting said second C5-C8 effluent to hydroisomerization in a second hydroisomerization section which is operated under conditions different from the first hydroisomerization section, and separately recycling hydromerizates from both hydroisomerization sections to said at least one separation section, and

withdrawing stream (1) from said at least one separation section and delivering stream (1) to a gasoline pool to provide a minimum content of C7- di-branched paraffins of 2% by weight.

REMARKS

Claims 6-10, 12-20 and 22-25 are amended to correspond to claims 6-10, 12-20 and 22-25 canceled from parent application Serial No. 09/517,071 (now allowed). In addition, claim 6 is amended to recite that the isomerization is passed directly to at least one adsorption or permeation zone. See, *e.g.*, the Figures, page 9, lines 11-13, and page 14, lines 3 through page 15, line 2. New claims 26-37 are directed to further aspects of applicants' invention. Claims 36 and 37 are similar to claims 29 and 30 of the allowed parent application.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 6-10, 12-20, 22-25 have been amended as follows:

6. (Amended) A process for producing a gasoline stock by hydro-isomerisation of a feed constituted by a C5 to C8 cut or fraction thereof containing at least C7 paraffins, comprising conducting hydro-isomerization of said feed in at least one hydro-isomerization section comprising at least one reactor and passing the resultant isomerizate to ~~and~~ at least one separation section~~, in which the hydro-isomerization section comprises at least one reactor, and the separation section comprises~~ comprising at least one unit so as to produce ~~and produces~~ at least two streams: a first stream which is rich in di- and tri-branched paraffins containing sufficient C7 - di-branched paraffins, and optionally ~~possibly in~~ in naphthenes and aromatic compounds which is sent to a ~~the~~ gasoline pool to provide a minimum content of 2% by weight of C7 - di-branched paraffins in the gasoline pool; and a second stream which is rich in straight-chain paraffins and mono-branched paraffins, ~~which is recycled~~ recycling said second stream to an ~~the~~ inlet to the hydro-isomerisation section, and passing the resultant isomerizate directly to at least one adsorption or permeation zone as to produce at least two streams.

7. (Amended) A process for producing a gasoline stock by hydro-isomerization of a feed constituted by a C5 to C8 cut or a fraction thereof, containing at least C7 paraffins, comprising:

conducting hydro-isomerization at least two hydro-isomerization ~~section~~ sections and performing a separation in at least one separation section comprising at least one adsorpotion separation unit or at least one permeation separation unit in which the separation section produces three streams: a first stream which is rich in di and tri-branched paraffins, and ~~possibly in~~ optionally contains naphthenes and aromatic compounds, which is sent to ~~the~~ a gasoline pool to provide a minimum content of 2% by weight C7-di-branched paraffins in the gasoline pool; a second stream which is rich in straight-chain paraffins which is recycled to ~~the~~

an inlet ~~to~~ of the first hydro-isomerization section; and a third stream which is rich in mono-branched paraffins which is recycled to ~~the~~ an inlet ~~to~~ of the second hydro-isomerisation section, and

wherein the operating conditions of the first and second hydroisomerization sections are different.

8. (Amended) A process according to claim 7, in which all of the effluent from ~~the~~ said first hydro-isomerization section traverses ~~the~~ said second hydro-isomerization section.

9. (Amended) A process according to claim 8, ~~in which~~ wherein the separation section is located downstream of the hydro-isomerization sections, the feed is mixed with the straight-chain paraffins recycled from the separation section~~,~~ and the ~~resulting~~ resultant mixture is sent to the first hydro-isomerization section,

~~the~~ effluent leaving the first hydro-isomerization section is mixed with the stream which is rich in mono-branched paraffins from the separation section, ~~then the~~ and the resultant mixture is sent to the second hydro-isomerization section, and

~~the~~ effluent from the ~~latter~~ second hydro-isomerization section is sent to the separation section.

10. (Amended) A process according to claim 8, ~~in which~~ wherein the separation section is located upstream of the hydro-isomerization sections,

the feed is mixed with the stream from the second hydro-isomerization section~~,~~ and the ~~resulting~~ resultant mixture is sent to the separation section,

~~the~~ effluent which is rich in straight-chain paraffins is sent to the first hydro-isomerization section,

the stream which is rich in mono-branched paraffins from the separation section is added to the effluent from the first hydro-isomerization section~~,~~ and the ~~ensemble~~ resultant combined streams are ~~is~~ sent to the second hydro-isomerization section.

12. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 11~~, in which the separation section ~~is constituted by~~ comprises at least two distinct units to carry out two different types of separation.

13. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 12~~, in which the separation section comprises one or more sections operating by adsorption and the feed contains more than 12 mole % C7+.

14. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 12~~, in which the separation section comprises one or more sections operating by permeation.

15. (Amended) A process according to ~~any one of claims 6 to 12~~ claim 12, in which the separation section comprises at least one unit operating by adsorption and at least one unit operating by permeation.

16. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 15~~, in which at least one light fraction is separated by distillation in a distillation column upstream or downstream of the hydro-isomerization and/or separation sections, said light fraction having an average boiling point lower than the average boiling point of feed entering said distillation column.

17. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 15~~, in which the feed contains ~~the~~ a C5 cut and at least one deisopentanizer and/or at least one depentanizer are located upstream or downstream of the hydro-isomerization and/or separation sections.

18. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 15~~, in which the feed contains a C6 cut but contains no C5, and at least one deisohexinizer is located upstream or downstream of the hydro-isomerization and/or separation sections.

19. (Amended) A process according to ~~any one of claims~~ claim 16 ~~to 18~~, in which the light fraction or ~~the~~ isopentane and/or ~~the~~ pentane and/or a mixture of the two, or ~~the~~ hexane, act as an eluent or a flushing gas for the adsorption or permeation separation ~~processes~~ unit, respectively.

20. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 18~~, in which butane and/or isobutane is used as an eluent or a flushing gas for the adsorption or permeation separation ~~processes~~ unit, respectively.

22. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 21~~, in which the feed comprises at least 12 mole % of hydrocarbons containing at least 7 carbon atoms.

23. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 21~~, in which the feed comprises at least 15 mole % of hydrocarbons containing at least 7 carbon atoms.

24. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 23~~, in which hydro-isomerization is carried out at temperatures in the range 25°C to 450°C, at a pressure in the range 0.01 to 7 MPa, at a space velocity, ~~measured in kg of feed per kg of catalyst per hour,~~ in the range 0.5 to 2 kg feed/kg catalyst/hr, and with an H2/hydrocarbons molar ratio in the range 0.01 to 50.

25. (Amended) A process according to ~~any one of claims~~ claim 6 ~~to 24~~, in which separation is carried out at temperatures in the range 50°C to 450°C and at a pressure in the range 0.01 to 7 MPa.

Claims 26-37 have been added.